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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/922,804	08/07/2001	Michikazu Matsumoto	740819-610	8887

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EXAMINER

ERDEM, FAZLI

ART UNIT

PAPER NUMBER

2826

DATE MAILED: 06/20/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/922,804

Applicant(s)

MATSUMOTO ET AL.

Examiner

Fazli Erdem

Art Unit

2826

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 28 March 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-10 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☐ Claim(s) _____ is/are rejected.
- 7) ☒ Claim(s) 6 and 10 is/are objected to.
- 8) ☒ Claim(s) 1-5 and 7-9 are subject to restriction and/or election requirement.

NATHAN J. ELYON
PATENT EXAMINER
TECHNOLOGY CENTER 2800

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s) _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Allowable Subject Matter

1. Claims 6 and 10 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1, 3-5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Agarwal (6,218,256) in view of Agarwal (6,465,828) further in view of Ouellet (5,747,361)

Regarding Claim 1, Fig. 7 of Agarwal shows an electrode and capacitor structure for a semiconductor device where detail 10 is the substrate, followed by polysilicon layer 48, insulating layer 14, Titanium nitride barrier layer 16 and a high melting point conductive layer 18.

Regarding Claims 3-5, in columns 10-12, Agarwal discloses the method of making an electrode and capacitor structure of Fig. 7.

Agarwal (6,218,256) fails to disclose the required barrier layer and the required stoichiometric structure. However, Agarwal (6,465,828) discloses a semiconductor container structure with diffusion barrier where the required barrier layer is disclosed. Furthermore,

Art Unit: 2826

Ouellet discloses a stabilization of the interface between aluminum and titanium nitride where the required stoichiometric structure is disclosed.

It would have been obvious to one of having ordinary skill in the art at the time the invention was made to include the required barrier layer and the stoichiometric structure in Agarwal (6,218,256) as taught by Agarwal (6,465,828) and Ouellet respectively in order to have a semiconductor interconnection structure with better performance.

3. Claims 2, 7-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nagasaka et al. (5,973,408) in view of Ito et al. (5,561,326).

Regarding Claim 2, Fig. 1 of Nagasaka et al. show an electrode structure for a semiconductor device where two titanium nitride films 261A and 261B are located above a protective films 35 and 34. An electrode wiring 151 is positioned above the two titanium nitride structures 261A and 261B. Nagasaka does not show the second titanium nitride structure to have a higher nitride structure. However, Ito et al. show a large scale integrated circuit device where in Fig. 2 two titanium structures 186 and 187 are located. Ito et al. further disclose that the second titanium nitride structure has a higher nitride ratio.

Regarding Claims 7-9, Figs. 1-4 of Nagasaka et al. and the Figs. 1-10 of Ito et al. show a method of making an electrode structure with two titanium nitride layers one with the second titanium nitride layer having a higher concentration of nitride.

Agarwal (6,218,256) and Nagasaka et al. fail to disclose the required barrier layer and the required stoichiometric structure. However, Agarwal (6,465,828) discloses a semiconductor container structure with diffusion barrier where the required barrier layer is disclosed.

Art Unit: 2826

Furthermore, Ouellet discloses a stabilization of the interface between aluminum and titanium nitride where the required stoichiometric structure is disclosed.

It would have been obvious to one of having ordinary skill in the art at the time the invention was made to include the required barrier layer and the stoichiometric structure in Agarwal (6,218,256) and Nagasaka et al. combination as taught by Agarwal (6,465,828) and Ouellet respectively in order to have a semiconductor interconnection structure with better performance.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Fazli Erdem whose telephone number is (703) 305-3868. The examiner can normally be reached on M - F 8:00 - 5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nathan Flynn can be reached on (703) 308-6601. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7722 for regular communications and (703) 308-7724 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

FE

June 15, 2003